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LICHEN NOTES No. 4.

A Study of Umbilicaria vellea and Umbilicaria spadochroa.

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The statement made by Nylander (Synopsis, Pt. II, p. 9) that sterile specimens of *U. vellea* are not easily determinable, is one to surprise an American student of lichens. The late Prof. Tuckerman long furnished us with our opinions on the taxonomy and specific delimitations of lichens, and his treatment of the Umbilicaria in Synopsis presented no difficulties whatever, once one came to know the commoner species. Tuckerman cites only two species of ash-colored Umbilicaria for America, *U. vellea* (L.) Nyl. and *U. hirsuta* (Ach.) Stenh. Of these two, *U. vellea* only is common, and our students have unhesitatingly referred all specimens of the ash-colored, whitish or brownish-ash-colored Umbilicaria, when black and hirsute below to this species. If, as Nylander asserts, specimens of *U. vellea* must be fertile to be identified with accuracy, it is evident that the distinguishing characters are apothecial, not thalline. This deduction is confirmed by the author's statement of its resemblance to *U. spadochroa* and of a difference in spore measurements. The spores of *U. vellea* are said to measure 9–12 by 6-7μ, those of *U. spadochroa* 18–29 by 10–18μ, a very considerable discrepancy.

Nylander credits *U. vellea* to Acharius, Methodus, p. 109, citing the amended dianogsis for the species found in Lichenographia Universalis, p. 673, as excellent. No mention is made of *U. vellea* as being a Linnæan species, nor is allusion made to its citation in the Acharian Prodromus. This is the more remarkable as Acharius himself duly credits the plant to Linnæus, with the synonym of *Lichen velleus*. It is thought that but few of the early lichenists rightly understood *U. vellea*, even Hoffman who was responsible for the generic name of Umbilicaria, and numbers of its species, miscalled and figured *U. polyrrhizos* for *U. vellea* in his Plantae Lichenosae. However the name figures in several of the eighteenth century floras. It is apparent on comparing the descriptions of *U. vellea* and *U. spadochroa* in the Prodromus and Methodus, that Acharius had no true conception of either species. The diagnoses are much alike, some of the characters at a later period held to distinguish the two, being used indiscriminately. Acharius must have been acquainted with *U. vellea* as found in the Linnæan herbarium, and it is really difficult to understand his uncertainty unless a word from Wainio explains,

In a paper entitled "Revisio lichenum in herbario Linnæi asservatorium," the latter records p. 7. that the specimens of *Lichen velleus* as found were sterile, and thus uncertain. Sterility or fertility counted for but little to the early species makers, the grosser differences at once apparent seeming to their minds the surer guide. While on the subject of the Acharian comprehension of *U. vellea*, it will be of interest to cite from Leighton's "Monograph of the British Umbilicariae," the results of his examination of authentic specimens of *U. hirsuta* and *U. vellea*, communicated by Acharius to Borrer, and found in the latter's herbarium. Leighton declares that the two appear to be identical, that *U. vellea* only was fertile. with spores double the size of *U. polyrrhisa* or 18-22 by 10-12μ. If these specimens from Archarius were identified before he reached definite conclusions regarding the specific limits of *U. vellea*, comment is unnecessary. But if they were determined on characters set forth in Li. Um. p. 673 l. c. there may be several inferences. Either Nylander is in error and *U. vellea* should have large spores: or large spores are concomitant to both *U. spadochroa* and *U. vellea*: or, the other physical characters of one or both plants may be inconstant, or finally the arbitrary separation of the two on sporal or other differences may be without justification. The delimitation of two lichens identical in other respects, because of difference in size of the spores is abhorrent to a conception of natural species. The thallus of an ash-colored Umbilicaria sp. on which are ultimately developed the apothecia of *U. vellea* and *U spadochroa* is none the less specifically one or the other despite its infertility, and if the thought is carried further until the larger spores of *U. spadochroa* have assumed their full size, may it not be proper to call the species *U. vellea*?

An endeavor to learn something of *U. vellea* from the writings of Linnæus is frustrated by the terseness of his descriptions. In "Species Plantarum," 3d Edition. p. 1617, *Lichen velleus* is described as "Lichen foliaceus umbilicatus subtus hirsutissimus" and quoting himself in "Fl. Lapp." the author amplifies with "Lichen folio subrotundo feltato margin fere integro, subtus maxime hirsutus." Linnæus cites the illustration in "Historia Muscorum of Dillenius," Fig. 5, pl. 82, as representative of the form, and the Rev. J. M. Crombie proves to us that the Linnæan guess or Dillenian drawing were both good. In his "Lichens of Dillenius Historia Muscorum, illustrated by his herbarium," Crombie says "that the specimen of *U. vellea* in Herb. Dill., to which is attached the descriptive label of 'Lichenoides coriaceum latissimo folio umbilicato et verrucoso' is sterile, and "the specimen of which the figure is not at all good, represents a very large and old state of the species.' "

One wonders how Crombie recognized a "sterile" state of *U. vellea* with the certainty indicated by his words, but that must remain a mystery so far as present knowledge helps. It may be pointed out as a curious consideration at this juncture that while type specimens of *U. vellea* (L.) Nyl. have been preserved, no one can state with definiteness whether they are representative of *vellea* or *spadochroa* as those plants are now understood. Acharius in Li. Um. p. 673 l. c. was first to make the effort of clearly marking limits for each of the two species. It is conceivable from Nylander's words (Syn. l. c.) that the Archarian dissociation impressed him as being fundamental. Th. Fries, "Lichenographia Scandinavica," considers that while Acharius rightly knew *U. vellea*, his recognition of *spadochroa* might be questioned. Whatever view is taken of the Acharian conclusion, the uselessness of going behind his amended diagnosis had been made apparent.

As the early writers delimited species almost entirely on macroscopic characters, it will be a matter of interest to learn if possible in what respect, and to what degree the two species—very near one another as all have agreed—were found to differ. There seems no better way to accomplish this end, than to take the diagnoses of Archarius, E. Fries, Schaerer, Nylander, Th. Fries and Tuckerman for a basis, and frame a composite description for each species. Such an abstract would naturally comprehend all of the individual variations noted by the several observers for each form.

U. vellea:—Thallus ash-colored, brownish, greenish or whitish ash-colored or whitish-pruinose; ample to large; leathery, rigid or thickened; smooth, scarcely elevated-punctate, or minutely rimulose-areolate; monophyllous and irregularly repand. Thallus below, brownish, brownish-black, blackish, or black; granulose-unequal, subhirsute, hirsute to very hirsute. Apothecia marginal, (sessile, Ach.) (patelliform, E. Fries), superficial, appressed, plane, small, margined, becoming convex, immarginate, or finally excluding the margin, or with a tumid margin; concentrically or gyrose-plicate, and E. Fries states that the disc may be papillose.

U. spadochroa:—Thallus greenish, brownish, or whitish-ash-colored, or quite white; small to large; rigid, subcoriaceous and thickened; smooth or elevated-punctate; monophyllous. Thallus below, pallid-ash-colored, brownish, brownish-black, blackish or black; areolate-granulate, denudate, exasperate, scabrid, papillose, lacerate or more or less hirsute. Apothecia marginal, plane, subsimple appressed, lecideine, the margin thickened or subpersistent, contracted or even extended, smoothish or sparsely gyrose-plicate; papillate from the center of the disc, or the verrucae deficient, when there may be a central depression.

A comparison of the foregoing descriptions will disclose that so far as color of upper surface is concerned the two species are much alike, and the same may be said of the size, texture and lobation. The upper surface of *U. spadochroa* is said to be smooth (Th. Fries) elevated-punctate and delicately rimose (Ach. Li. Um. p. 229) but the latter describes both species as elevate-punctate, and the rimulose-areolate characteristic is known to be a product of age and habitat. The under surface presents greater disparities, unimportant in color, but marked in other respects. It will be noted that *U. vellea* as described is usually hirsute with the range of variation from "granulose-unequal" (Nyl. Syn.) to very hirsute; and that *U. spadochroa* as mentioned is not commonly so well provided with rhizinae, may even be "denudate" (Schaer. Eu.) or conditioned variably to "densely rhiz inose" (Th. Fries Li. Scan.). In apothecial characters much diversity is shown, according to Acharius (Li. Um. p. 672) *U. vellea* has constantly plane marginate apothecia with the disc concentrically plicate: while those of *U. spadochroa* are said to be marginal, usually plane, the margin thickened and contracted, the disc not uncommonly plicate and solitarily papillate from the center. E. Fries (Li. Eu. Ref.) asserts that the apothecia of *U. vellea* may be papillate, a statement only explicable by the inference of his having mistakenly described *U. spadochroa*. The plicate of the apothecia are indifferently concentric or gyrose; and that organ may be appressed in both species.

In brief the differences between the species as here summarized are really inconsiderable, except that one of discordance in apothecial conformation. This factor in itself would scarcely seem of sufficient importance to separate the two, but Nylander and others have found that the papillate apothecia of *U. spadochroa* afford large spores. An instance of crude botany reinforced by modern histology. With Nylander first to point out sporal differences, the labors of other lichenists seemed to become confirmatory, if Hepp is excepted. In the latter's work on the spores of European lichens, are figured and micrometrically recorded the spores of *U. vellea* and *U. spadochroa* as examined in the Exsiccati of Moug. & Nest, E. Fries and Schaerer. In plate XXXIV, fig. 306 Hepp s Sporen, the spores of *U. spadochroa* (Ehrh.) Ach. Li. Um. p. 229, are alleged to be illustrated. The figures and measurements are derived from examination of E. Fries, Li.Suec. Exs. No. 130: Moug. & Nest, Exs. Nos. 540 and 746, and Schaerer, Exs. Nos. 141 and 142. All have small spores, vis. 9–11 by 5–8μ, and by modern interpretation belong to *U. vellea* and not *U. spadochroa.*

Nylander avowedly, and Th. Fries inferentially based their diagnosis of *U. spadochroa* on the Acharian conception, and both the former definitely accept the papillate apothecia as distinguishing. Is it not strange that the various specimens from those exsiccati examined by Hepp, doubtless all determined on the Acharian data, and conjecturally all provided with the papillate apothecia of the species, should have yielded small spores ? It is reasonably certain from the description, that *U. vellea* of E. Fries (Li. Eu. Ref.). is *U. spadochroa* as now understood. If No. 130 of Fries Exs. Li. Luec. is representative of that author's var. b. *spadochroa* as may be inferred from the text, with its determination based on the Acharian conception, then Nylander's assumption of small spores for *U. vellea* is really inexplicable. Schaerer (in Eu.) affirms No. 130, Fries Exs to be equivalent to *U. cirrhosa* Hoffm., and Wainio (Revisio Lich. Hoffmannianorum, p. 16), finds the specimens of *U. cirrhosa* in Hoffman's herbarium to be *U. spadochroa* (Ehrh.) Ach.

Some one has erred, but on whom shall the burden rest? No. 141 of Scharer's Exs. is his form d. *rupta* of *U. vellea* var. *spadochroa*, and No. 142 represents his form *cinereo-rufescens.* Schaerer cites the latter as synonymous with *U. spadochroa* DC., *U. vellea* Ach., and *Lichen valleus* Ehrh. ! Plate XIV, fig. 117 of Hepps's Sporen is said to figure the spores of U. vellea (L.) Ach. Syn. p. 68. The specimens examined were from Moug. & Nest, Exs. No. 344, and Schaerer's Exs. Nos. 137, 138, 139 and 140. All have large spores viz. 18–24 by 8–13μ, and several numbers by Nylander and others would be referred to *U. spadochroa.* Schaerer lived a little early to fully avail himself of the manifold advantages of the compound microscope, and he variously distributes the above cited examples to his Enumeration, they appearing to have been very dissimilar externally. No. 344 Moug. & Nest, Exs. is referred to his *U. vellea* var. a, *hirsuta.* *U. hirsuta* as now understood has spores of 9–12 by 4–8μ, or small. Nos. 137, 138, 139 and 140 of his Exs. Schaerer defines as form b, *vellei-formis*, f. c. *vulgaris*, f. d.

abortiva, and f. e. *rupta* respectively of his *U. vellea hirsuta*. From the descriptions of Nos. 137 and 139 (Eu. l. c.) both can be easily placed with *U. spadochroa* on their macroscopic characters, the other two are doubtful however.

Reviewing what has been written, it will be perceived that each author prior to Nylander's Synonymy, in dealing with *U. vellea* and its ally, became a law unto himself with respect to their specific limits. It is questionable if Nylander himself constituted his diagnosis of *U. spadochroa* on a clear knowledge of the early herbarium examples, although no man had ampler opportunities to acquire information. It is conceivable that *U. spadochroa* as considered in Synopsis is a purely arbitary creation, based on the observation that large spores are concomitant with papillate apothecia. If this were an established fact, with no ascertainable record of deviation, a fairly good warrant for specific rank would ensue. The writer has found, however, through examination of an extended series of American ash-colored Umbilicariae that specimens are not uncommonly met with, provided with *distinctly papillate* apothecia which *do not* yield large spores! In fact the measurements accord with those of *U. vellea*. As the specimens are black and very hirsute below and bear every other characteristic of the species they may with assurance be referred to *U. vellea*.

In the final analysis it is seen that all the characters of *U. spadochroa* except its large spores may be shared by *U. vellea*. On this distinction alone it is believed that the form scarcely deserves specific rank, and should be reduced to a variety or modification of the older *U. vellea*. No. 198 Decades of N. Am. Lichens, issued as *U. spadochroa* Hoffm., in our copy affords small spores only, and being unprovided with papillate apothecia should be considered as representative of *U. vellea*. Prof. John Macoun collecting in 1905, on the St. Lawrence below Quebec, found an Umbilicaria sp. which in the specimen submitted to the writer, offers characteristics at once suggestive of *U. Dillenii* Tuckerm., on the one hand, and *U. vellea* on the other. The plant is brownish at the circumference as in *U. Dillenii*, whitish-pruinose at the center as in *U. vellea*, and like the latter hirsute below. The apothecia and spores are those of *U. Dillenii*, but the upper surface is rimulose-areolate as in *U. vellea*. Prof. Macoun suggests that the form be given a varietal name, but it is hardly thought desirable to do so at present.

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SULLIVANT MOSS CHAPTER NOTES.

If any members of the Sullivant Moss Chapter have collected the lichen, *Solorina saccata*, I shall be very glad to hear from them and to exchange specimens with them. I should also be glad to hear from any one who has specimens of *Solorina saccata* in his herbarium, giving me the locality where they were collected.

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